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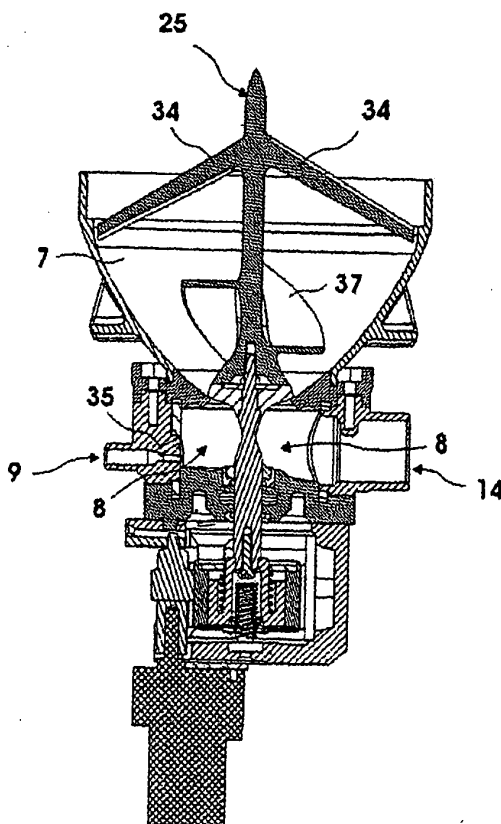
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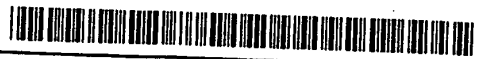
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(54) Title: **AN AUTOMATIC WASHING AGENT DOSING DEVICE**



(57) Abstract: The present invention is related to a washing agent dosing device (1) for household appliances especially for washing machines. The automatic washing agent dosing device (1) consists of a body preferably with a lower (4) and an upper (2) body assembly, a driving unit (3), a shaft gear (5) and a mixing shaft (6) with a mixer (25) for mixing, breaking the washing agent to avoid lumping and forcing the washing agent to dosing cell (8).

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AN AUTOMATIC WASHING AGENT DOSING DEVICE

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FIELD OF INVENTION

The present invention is related to a washing agent dosing device for household appliances especially for washing machines.

10 BACKGROUND OF THE INVENTION

The advantage of having an automatic washing agent dosing device on a washing machine is that it provides ease and comfort of use for the user. Instead of filling up the washing agent container each time, the user fills up the washing agent
15 container once and forgets about it for a certain time period.

In the known techniques, measuring the amount of the washing agent for each washing cycle could be done by different ways such as measuring the weight, the volume and the time. In these techniques, the designated amount of the powder-
20 washing agent is filled in a unit volume for dissolving it with water and the rest of the washing agent is insulated. But problems may arise while taking the perfect amount of washing agent at each dosing, while insulating the dosing volume from the water pressure, and keeping the washing agent for a suitable time period in the washing agent storage.

25

In EP 0297371, a dosing device is defined. The device has a receiving container and a rinsing-out space for the apportioned metering of, in particular, powder forms of cleaning material from the receiving container into the rinsing-out space for supplying industrial dishwashers or washing machines. A solution is to be
30 provided which allows the metering both of satisfactorily pourable powder

cleaners and of powder cleaners with lumps and the like, whilst always achieving essentially the same metering capacity even with different levels of the powder cleaner in the receiving container and additionally reducing the risk of moisture entering the receiving container from the rinsing-out space. This is achieved by metering holes in the bottom of the receiving container and in each case a collection plate, distributed by an agitator, arranged with a distance below the metering holes, and a scraping mechanism which is movable in the space between the underside of the bottom and the collection plates and essentially wipes over the plate surfaces. Scraping mechanism and agitator have dosing fingers and agitator fingers.

In GB 2306457, a dispensing system for use with a cleaning machine, e.g. an industrial dishwasher, comprises a container containing cleaning liquid and a receptacle which removably supports the container in an inverted orientation. The container has a neck which is closed by a valve which is opened, or can be opened, when the container is supported by the receptacle. Preferably, the valve is a push-fit in the neck of the container and is closed by a spring when not in use. The valve may be opened automatically by an elongate, tapering spike either fixed or movable within the receptacle. The container neck may be fitted with a sealing membrane and an outer closure. In use, water is supplied to the system through pipe. The water may be taken from the cleaning machine via a filter, injected with air and delivered using a pump, which may be peristaltic, to the receptacle. The air displaces cleaning fluid from the container which mixes with the water and is then discharged to the cleaning machine via outlet.

In EP 0611843, an automatic powder detergent dispensing and metering system for washing machines, in particular dishwashing and clothes washing machines, comprising a reservoir adapted to hold the powdered detergent, whose addition into the washing tank or tub of said machines occurs through a flow of air generated by pneumatic generator means of a known type is defined.

In WO 9815682, a dosing apparatus for pastelike substances and mixtures thereof with a solvent by means of an injector, comprising an integrated shut-off device, is defined. The apparatus contains a detection device which detects the amount of paste according to conductimetry. The shut-off device is a dual piston valve closing an opening between the paste supply tube and an injector suction chamber as well as an opening between the solvent supply tube and an injector pre-chamber. The invention also relates to a method for dosing pastelike substances and the mixtures thereof with a solvent by means of such a device. By opening a shut-off device in a supply tube for a pressurized solvent, a dual piston valve moves against an opposing force. This releases a connection between a paste supply tube and an injection suction chamber, followed by a connection between the solvent supply tube and the injector pre-chamber. The paste is suctioned by an injector operating according to the hydraulic pump principle and mixed with release solvent. The mixture is injected into a measuring section wherein a conductimetry device measures the amount of paste dissolved in the mixture. The shut-off device is closed when the required dose of paste is obtained, whereupon the circuit which was previously in open position is shifted in reverse order to closed position.

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SUMMARY OF INVENTION

The object of the invention is to develop a device that automatically doses the powder detergents for washing in household appliances.

30

DRAWINGS OF THE PREFERRED EMBODIMENT

An embodiment of the automatic washing agent dosing device, which is realised in order to attain said object of the invention is illustrated in the attached
5 drawings, wherein;

Figure 1a, is the three dimensional view of the automatic washing agent dosing assembly

Figure 1b, is the top view of the automatic washing agent-dosing device

10 Figure 2, is the AA sectional view of the automatic washing agent-dosing device with a sealing head closes and opens the gate from the container side

Figure 3, is an AA sectional view of the automatic washing agent-dosing device with a sealing head closes and opens the gate from the dosing cell

15 Figure 4, is an AA sectional view of the automatic washing agent-dosing device with a sealing head closes and opens the gate in a neck

Figure 5, is the exploded view of the automatic washing agent-dosing assembly

Figure 6, is the exploded view of the upper body

Figure 7, is the exploded view of the lower body

20 Figure 8, is the exploded view of the driving unit

Figure 9, is the exploded view of the mixing shaft

Figure 10, is the exploded view of the shaft gear

Figure 11, is a three dimensional view of the mixing shaft with mixture detents

25 Figure 12a, is a prior art schematic view of the sealing head, and edge of the gate with the water particles while opening.

Figure 12b, is the schematic view of the sealing head, and edge of the gate of the invention with the water particles while opening.

30 Figure 13, is the three dimensional view of the different types of the sealing heads placed according to the dashed edge of the gate.

The components shown in the drawings have the following reference numbers,

1. Automatic washing agent dosing device
- 5 2. Upper body
3. Driving unit
4. Lower body
5. Shaft gear
6. Mixing shaft
- 10 7. Container
8. Dosing cell
9. Water inlet
10. Dust seal
11. Dust seal holder
- 15 12. O-ring holder
13. Lower cover
14. Water outlet
15. Corkscrew
16. Filter
- 20 17. Electronic switch
18. Control unit
19. Driving screw
20. Lower housing
21. Squeezer
- 25 22. Spring
23. Main shaft's gear
24. Driving nut
25. Mixer
26. Washer
- 30 27. Sealing head

- 28. Main shaft
- 29. Driving nut
- 30. Driving gear
- 31. Connecting plate
- 5 32. DC motor
- 33. Gate
- 34. Arm
- 35. Nozzle
- 36. Arm corkscrew
- 10 37. Winding
- 38. Notch
- 39. Mixture detent
- 40. Inner surface
- 41. Neck

15

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Household appliances, especially washing machines, include a control unit (18)
20 and an automatic washing agent dosing device (1) for storing and releasing the
washing agent disposed in the required amount for each washing cycle.

The automatic washing agent dosing device (1) comprises an upper body (2) for
storing and dosing the washing agent, a lower body (4) for housing, a mixing
25 shaft (6) for mixing the washing agent, a driving unit (3) for driving the mixing
shaft (6), and a shaft gear (5) for transmitting the movement.

The upper body (2) comprises a container (7), a dosing cell (8) for dosing and
mixing the detergent, a water inlet (9), a dust seal (10), a dust seal holder (11), an

O-ring holder (12), a water outlet (14), a gate (33), a lower cover (13) and a corkscrew (15) with a filter (16).

5 The lower body (4) comprises one or more electronic switches (17), a lower housing (20), and a driving screw (19).

The shaft gear (5) comprises an squeezer (21), a spring (22), a main shaft's gear (23), and a special driving nut (24).

10 The mixing shaft (6) comprises a mixer (25), a washer (26), a sealing head (27), a main shaft (28) and a driving nut (29).

The driving unit (3) comprises a driving gear (30), a DC motor connecting plate (31), and a DC motor (32) that can be turned both in clockwise and counter
15 clockwise directions.

The mixer (25) mixes and breaks the washing agent to avoid any lumpings. There are one or more extended arms (34) on the upper part of the mixer (25). The arm (34) has slanted and/or curved forms for helping the washing agent flow easily to
20 the gate (33). On the lower half of the mixer (25), there are one or more arm corkscrews (36) and one or more mixture detents (39).

The arm corkscrew (36) has one or more windings (37). The arm corkscrew (36) helps the washing agent to flow down into gate (33) by the forward movement of
25 the main shaft (28), and always keeps the gate clean to avoid from possible smudging and lumping. With every backward movement of the main shaft, the corkscrew (15) this time urges the washing agent upwards, so that the gate (33) closes properly. The mixture detent (39) cleans the gate (33) continuously from
30 the washing agent with the movement of the mixer (25).

The sealing head (27) is assembled to the top of the main shaft (28) and closes the gate (33) by the backward movement of the main shaft (28) by turning and touching to the edge of the gate (33). In addition to this, there is a pressure mechanism in the shaft gear (5) that provides perfect closing at the gate (33) by transmitting this proper pressure to the sealing head (27). The sealing head (27) also provides a perfect flow into the dosing cell (8) for the detergent.

The sealing head (27), prevents the stored washing agent from mixing with the water with a notch (38) by which water drops or puddles cannot stay on and leave from the sealing head (27) or move through the lower part of the sealing head (27) instead of moving through the upper parts of the sealing head (27) face with the washing agent. After closing the gate (33), water-washing agent mixing takes place in the dosing cell (8). At this instant, water particles stay on the rough surfaces, especially on the corners or recesses. The lower end of the sealing head (27) forms such a recess, and water particles stay at this connection part. When the sealing head (27) moves with the main shaft (28) in order to let the washing agent fill into the dosing cell (8), the said water particles try to stay on the sealing head (27) and at the corner of the gate (33) just at the beginning. They try to move with the sealing head (27), and begin to stretch from the corner of the gate (33) as well. The notch helps this water particles stay at the lower part of the sealing head (27) and prevents to raise to the upper surface of the sealing head (27) and not to mix with the washing agent (12b).

The water inlet (9) has one or more than one nozzle (35), which have the proper angles and sections to guide the water as needed, and provide the jet flows of water to reach everywhere in the dosing cell (8) for cleaning. The divergent or convergent exit of the nozzle (35) can arrange the water flow. So the jet flow for cleaning and slow flow for providing nice mixes without splashing. The water inlet (9) also causes a perfect timing for the unit dosing cycle.

The water outlet (14) has a wide cross-section comparing to the water inlet (9) cross section for passing the washing agent water mixture as fast as needed. The filter (16) that is placed into the water outlet (14) acts as a barrier for the washing agent particles which are not dissolved by the water turbulence. In order to
5 dissolve the washing agent better, in addition to the filter (16), the corkscrew (15) is provided to maintain a better vortex at the water outlet (14).

The lower cover (13) holds all the sealing parts and keeps the main shaft (28) straight. Lower cover (13) has an inner surface (40) that forms the bottom face of
10 the dosing cell (8), and curved surface of this face helps to the washing agent - water mixture to flow easier.

The control unit (18) directs the DC motor (32) to rotate the driving unit (3). Then driving unit (3) transmits this action to the main shaft (28). This causes the
15 forward movement of the main shaft (28) and washing agent begins to fill into the dosing cell (8). After dosing cell (8) is filled, the backward movement of the main shaft (28) closes the gate (33). Then a valve is opened and water flows to the water inlet (9) and directed by the nozzles (35). While water is flowing to the dosing cell (8), washing agent is first dissolved by the water turbulence in the
20 dosing cell (8) and is forced towards the tub by the water flow. While leaving from the dosing cell (8), the corkscrew (15) directs the detergent-water mixture to the filter (16), in order to prevent lumping. In this way one dose of powder washing agent is sent to the tub. By repeating this cycle for several times, the
25 needed amount of washing agent referred by the washing program being used, will be sent to the tub.

The main shaft (28) supports the sealing head (27) and the mixer (25), and also keeps the sealing elements on its body. The driving nut (29) fits into the hole on the main shaft's gear (23). In the preferred embodiment a hexagonal shaped hole
30 is used. There is one hole on the driving nut (29) for connection with the main

shaft (28) and another one for connection to the driving screw (19). While the driving nut (29) is mounted to the main shaft's gear (23); the spring (22), the squeezer (21) and the driving nut (24) are also placed to the main shaft's gear (23) together, before being connected to the main shaft (28). The squeezer (21) and the driving nut (24) are fixed to the main shaft's gear (23) preferably by screwing. The driving nut (24) has a screw hole for driving screw (19). While mounting, the main shaft's gear (23) is fitted to the driving screw (19) in the lower housing (20). The main shaft's gear (23) is driven by the driving gear (30) connected to the DC motor (32).

10

When the DC motor (32) is driven in one direction, at the same time the driving gear (30) and the driving screw (19) also begin to turn. While driving screw (19) is turning the driving nut (29) is forced to turn with the driving screw (19) together. Since the driving nut (29) is attached to the driving screw (19), it begins to turn on the driving screw (19) axis. This causes the driving nut (29) to rise in the main shaft's gear (23). This movement continues until the squeezer (21) touches to the electronic switch (17) and the control unit (18) stops the DC motor (32). But thanks to the spring (22), the squeezer (21) continues to compress the main shaft (28) to the gate (33). When the control unit (18) begins to open the gate (33), the DC motor (32) begins to turn in the reverse direction. The driving gear (30), the main shaft's gear (23) and the driving nut (29) begins to turn. But thanks to the driving screw (19), the driving nut (29) begins to move in backward direction. When the main shaft's gear (23) touches the electronic switch (17), the control unit (18) stops the DC motor (32). When the driving nut (29) moves forward and backward, the main shaft (28), the sealing head (27) and the mixer (25) move with the driving nut (29) synchronously. So when the sealing head (27) opens or closes the gate (33), and the dosing cell (8) is filled by the washing agent and is insulated from the water, the mixer mixes and forces the washing agent particles in the container (7).

30

In the preferred embodiment of the invention, the sealing head (27) closes and opens the gate (33) from the container (7) side while the mixing shaft (6) moving forward and/or downward (Fig 2). In other embodiment of the invention, the sealing head (27) closes and opens the gate (33) from the dosing cell (8) side while the mixing shaft (6) moving forward and/or downward (Fig 3). According to the embodiment the suitable shaped sealing head (27) is used in the automatic dosing device (1) (Fig 13).

In another embodiment of the invention, the mixing shaft (6) includes one more sealing head (27) as a piston, and the gate (3) includes a neck (41). The neck (41) preferably has a hollow cylindrical shape and can close the side surfaces between the two sealing head (27) at the gate (33). So while the mixing shaft (6) is moving forward and downward, the two sealing heads (27) move with the mixing shaft (6) together. When the mixing shaft (6) moves towards the container (7), one of the sealing shafts is released from the neck (41) and the washing agent begins to fill between the two sealing heads (27). By reverse moving of the mixing shaft (6) the left sealing shaft (27) enters the neck (41) and the filled washing agent is confined between two sealing head (27). When the other sealing head (27) is released from the neck (41), the filled washing agent begins to pass through the dosing cell (8). Since the washing agent is dosed by confining, liquid or granular washing agents can be used in this embodiment (Fig 4). The dosing cell (8), and the container (7) are insulated from the other by the sealing heads (27) and the neck (41). The dosing cell (8) and the container (7) are insulated from the other by the sealing heads (27) and the neck (41) while the unit dose is being transferred so the water at the dosing cell (8) and washing agent at the container (7) cannot affect each other.

When the washing agent is below the desired level the machine will preferably warn the customer to fill in the washing agent storage again.

CLAIMS

1. An automatic washing agent dosing device (1) for a household appliance, such
5 as a washing machine, comprising a driving unit (3), a lower body (4), an
upper body (2) which has a container (7) for storing the washing agent, a
dosing cell (8) for mixing the washing agent and water, and a gate (33)
between the container (7) and the dosing cell (8), a mixing shaft (6), a shaft
10 gear (5), and a driving unit (3) characterised in that; the mixing shaft (6)
comprises a main shaft (28) driven by the drive unit (3), a mixer (25) and one
or more than one sealing head (27) that is assembled to the main shaft (28) and
while the main shaft (28) is moving forward and/or backward and turning
around its moving axis, the sealing head (27) opens and closes the gate (33)
15 and touches the gate (33) edge for providing a perfect washing agent flow
from the container (7) to the dosing cell (8) and insulating the washing agent
in the container (7) from the water while the unit dose washing agent is being
mixed, dissolved and flowed by the water to the washing tub without any
residue in the dosing cell (8) and the mixer (25) mixes and breaks the washing
20 agent to avoid lumping and forces the washing agent to the dosing cell (8)
2. The automatic washing agent dosing device (1) as in claim 1, characterised in
that, the mixer (25) comprising one or more extended arms (34) with one or
more than one slant and/or curved forms and/or surfaces for helping the
washing agent to flow easily to the dosing cell (8), has one or more mixture
25 detents (39) for cleaning the gate (33) continuously from the washing agent
with the movement of the mixer (25) and has one or more arm corkscrews (36)
with one or more windings (37) for helping the washing agent to flow down
and/or flow up for keeping the gate (33) of the dosing cell (8) clean to avoid
possible smudging and lumping and forcing the washing agent to the dosing
30 cell (8).

3. The automatic washing agent dosing device (1) as in claim 2, characterised in that, the sealing head (27) avoids the stored washing agent from mixing with the water with a notch (38) whereby water cannot stay on the edge of the gate (33) and on the surface of the sealing head (27) which touches the washing agent.
4. The automatic washing agent dosing device (1) as in claim 3, characterised in that, the upper body (2) comprising a water inlet (9) which has one or more nozzles (35), which have the proper angular directions, divergent or convergent cross sections to guide the water as needed, and provides the flows of water to reach and clean everywhere in the dosing cell (8).
5. The automatic washing agent dosing device (1) as in claim 4, characterised in that, the upper body (2) comprising a water outlet (14) that has a wide cross section compared to the cross section of the water inlet (9) for passing the washing agent water mixture as fast as needed, and has a corkscrew (15) for causing a better vortex at the water outlet (14), and a filter (16) for functioning as a barrier for the washing agent particles which were not dissolved by the water turbulence.
6. The automatic washing agent dosing device (1) as in claim 5, characterised in that, the upper body (2) comprising a lower cover (13) that forms the bottom face of the dosing cell (8) holds all the sealing parts, keeps the main shaft (28) straight, has an inner surface (40) that forms the bottom face of the dosing cell (8), and the curved surface of this face helps the washing agent - water mixture to flow easier.

7. The automatic washing agent-dosing device (1) as in claim 6, characterised in that, the upper body (2) comprises a dust seal (10), a dust seal holder (11) and an O-ring holder (12).
- 5 8. The automatic washing agent dosing device (1) as in claim 7, characterised in that, the lower body (4) comprises one or more electronic switches (17) for using electronic signals in order to open/close the gate (33) by the movement of the sealing head (27) within the operation time and open/close the valve at the water inlet (9), a lower housing (20) and a driving screw (19).
- 10 9. The automatic washing agent dosing device (1) as in claim 8, characterised in that, the shaft gear (5) comprises a squeezer (21) for compressing the main shaft (28) to the gate (33) even though the driving unit (3) is stopped, a spring (22) for achieving the right pressure for closing the gate (33) by pushing the squeezer (21), a main shaft's gear (23) driving the driving unit (3) and turning around the driving screw (19), and a driving nut (24) turned by the main shaft's gear (23) and forced to move on the driving screw (19) forwards or backward for compressing the spring (22), and sending electronic signals by touching the electronic switch (17) to the control unit (18) and has a screw hole for driving screw (19).
- 15 20 10. The automatic detergent dosing device automatic washing agent dosing device (1) as in claim 9, characterised in that, the mixing shaft (6) comprises a washer (26) and a driving nut (29) moved by the driving screw (19) for transmitting the action to the main shaft (28).
- 25 11. The automatic washing agent dosing device (1) as in claim 10, characterised in that, the driving unit (3) comprises a driving gear (30) for transmitting the rotational movement to the main shaft's gear (23), a DC motor connecting

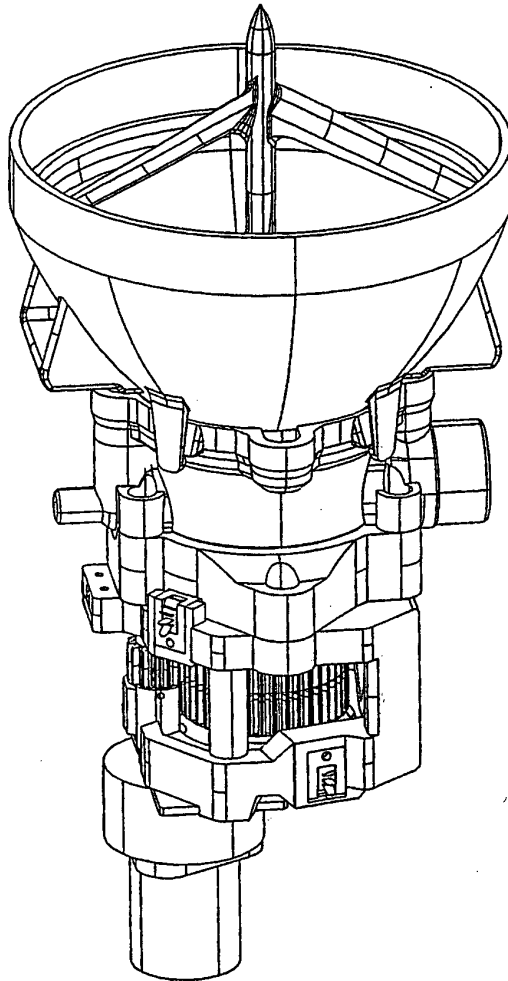
plate (31), and a DC motor (32) that can be turned both in clockwise and counter clockwise directions.

12. The automatic washing agent-dosing device (1) as in claim 11, characterised
5 in that, the sealing head (27) closes and opens the gate (33) from the container
(7) side while the mixing shaft (6) is moving forward and/or downward.
13. The automatic washing agent-dosing device (1) as in claim 11, characterised
10 in that, the sealing head (27) closes and opens the gate (33) from the dosing
cell (8) side while the mixing shaft (6) is moving forward and/or downwards.
14. The automatic washing agent dosing device (1) as in claim 1 to 10,
characterised in that, the mixing shaft (6) includes one more sealing head (27)
sequential to the other, the gate (3) includes a neck (41) which preferably has a
15 hollow cylindrical shape and can close the side surfaces between two sealing
head (27) at gate (33) and while the mixing shaft (6) is moving forward and
downward, two sealing heads (27) move with the mixing shaft (6) inside the
neck (41) and just one of them moves in the dosing cell (8) and the container
(7) for filling the washing agent in the container (7), passing to the dosing cell
20 (8) by confining the liquid or granular washing agents between two sealing
heads (27) and neck (41) for insulating, the dosing cell (8), and the container
(7).

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Figure 1a

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Figure 1b

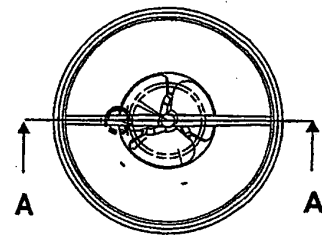
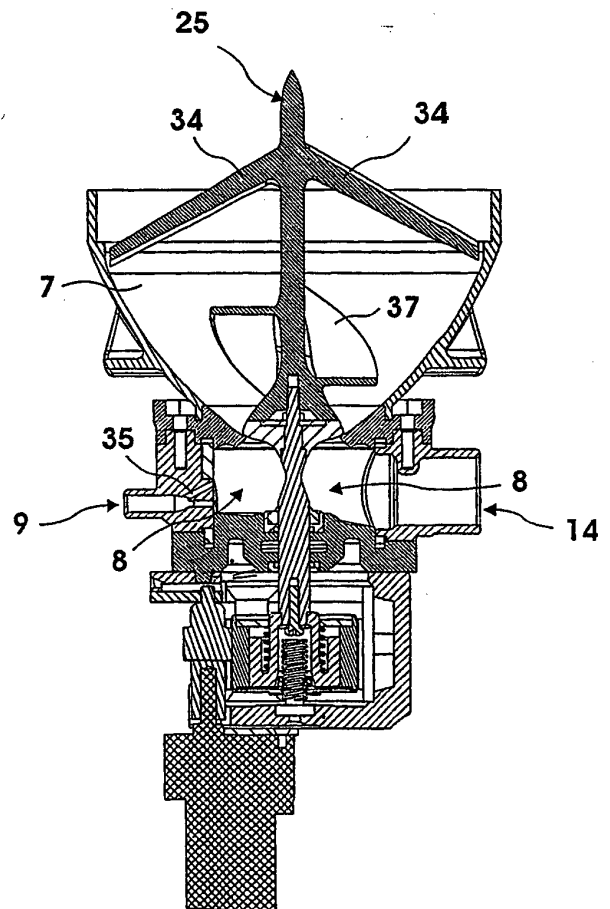


Figure 2



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Figure 3

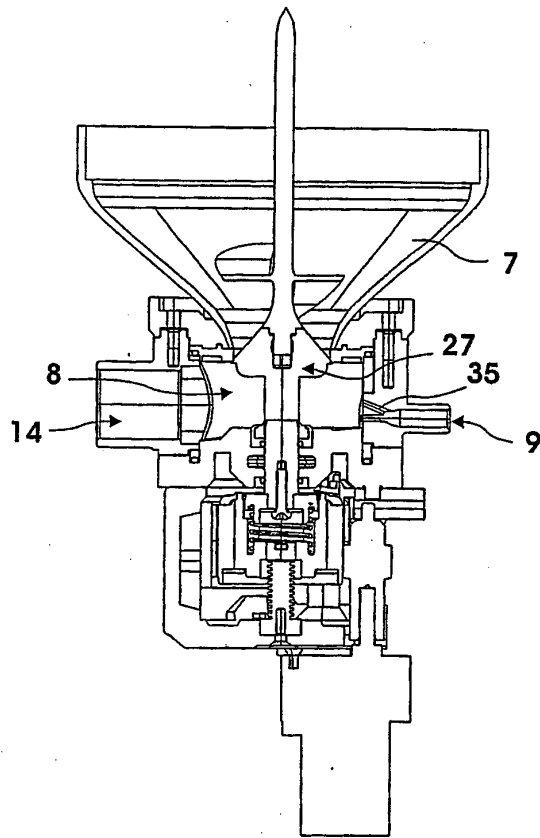
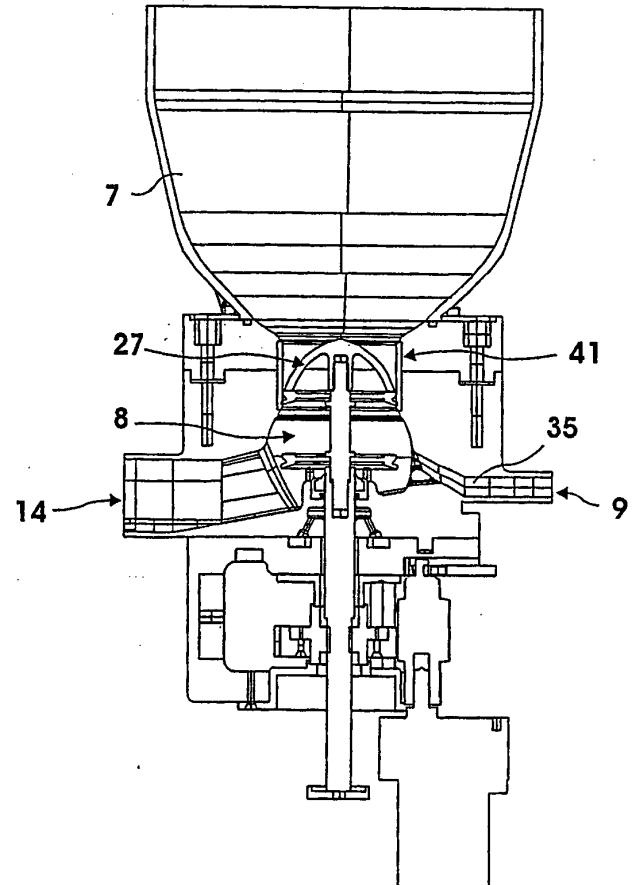


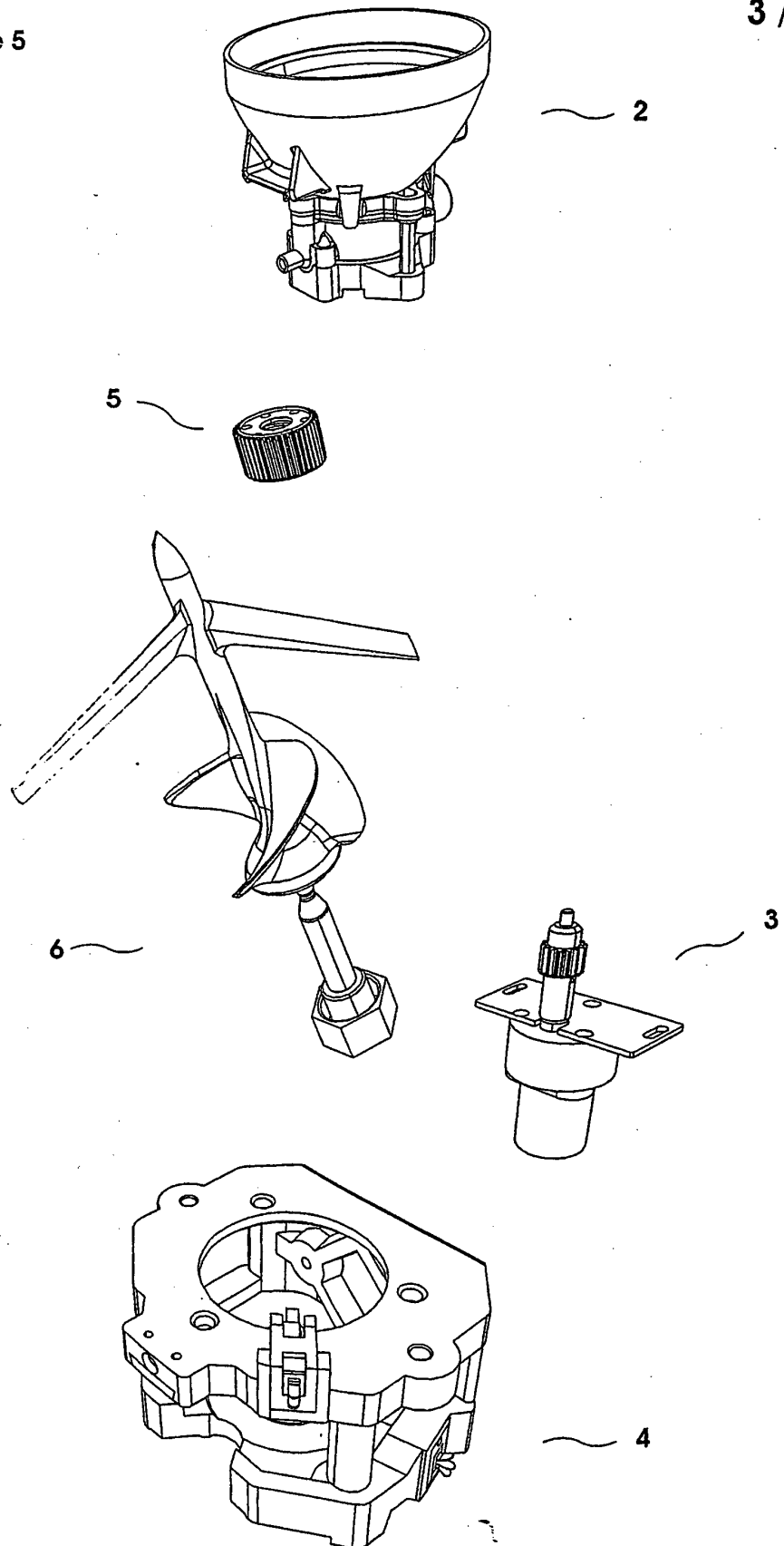
Figure 4



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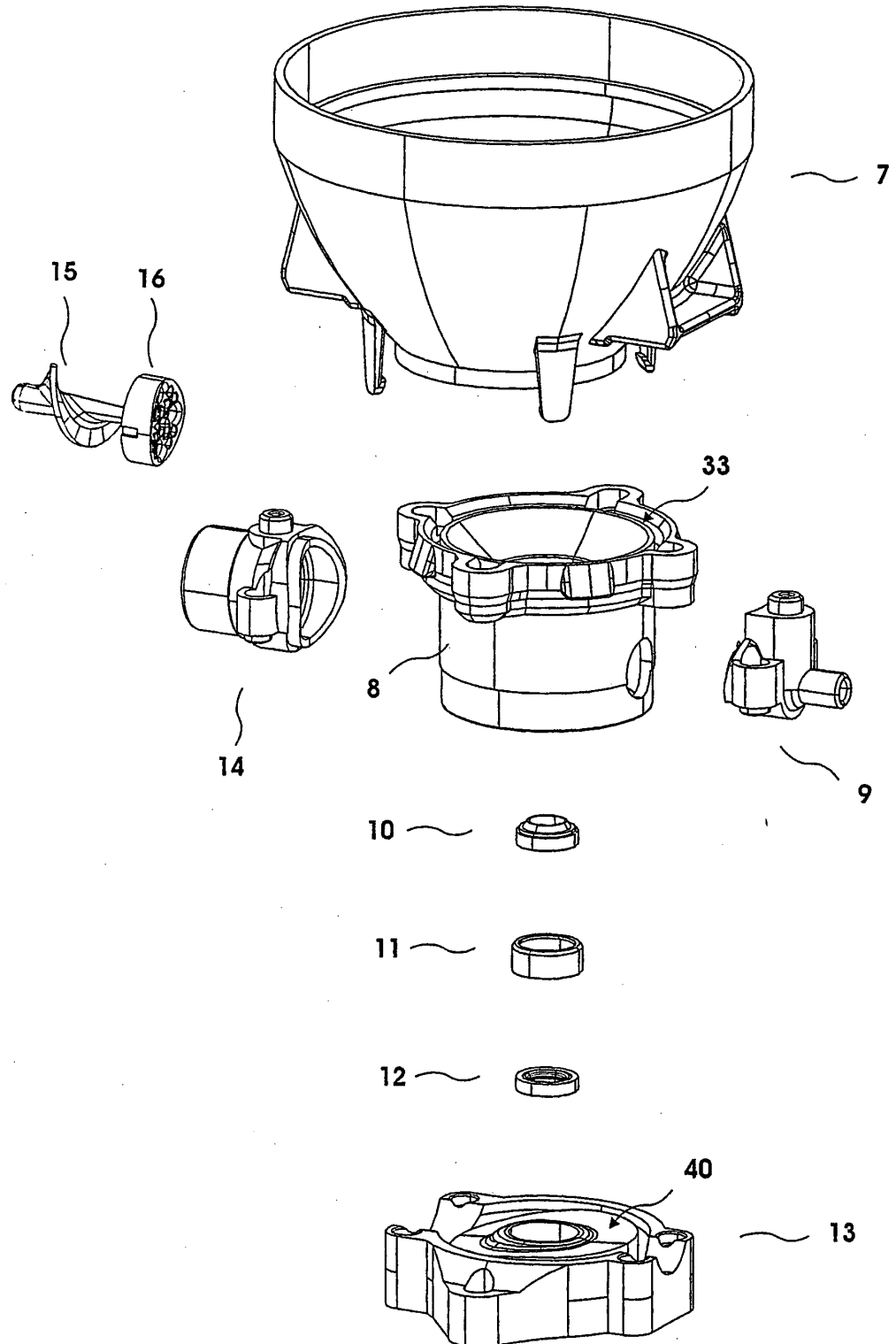
Figure 5



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Figure 6

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Figure 7

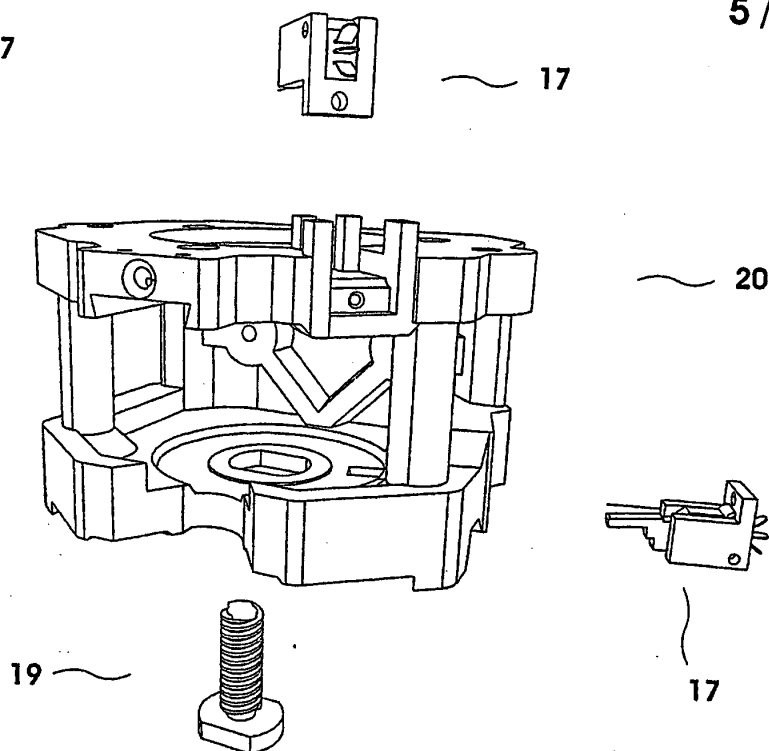
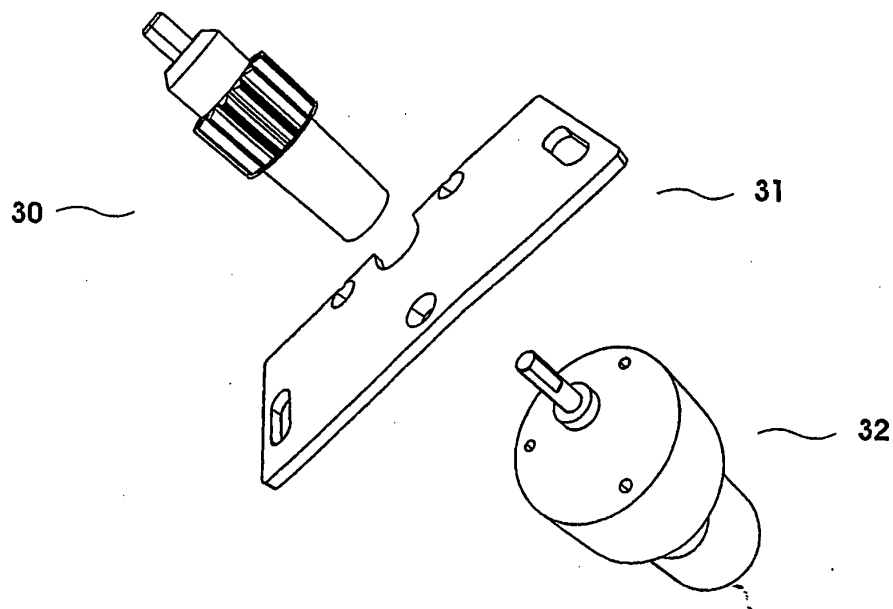


Figure 8



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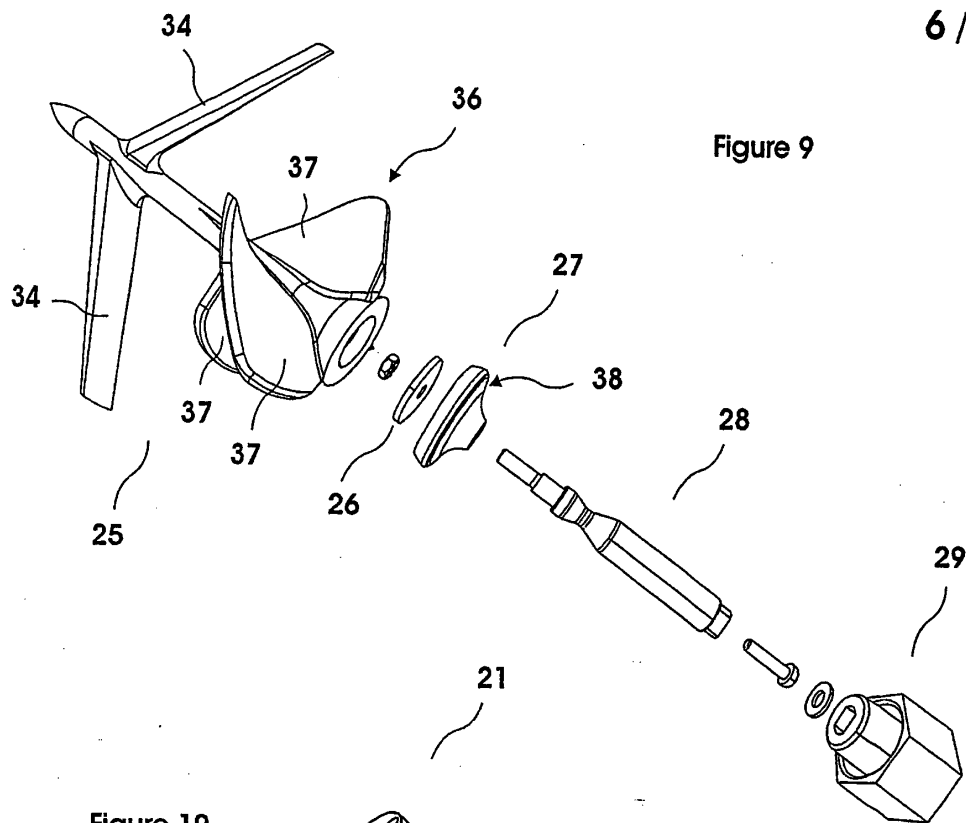


Figure 9

Figure 10

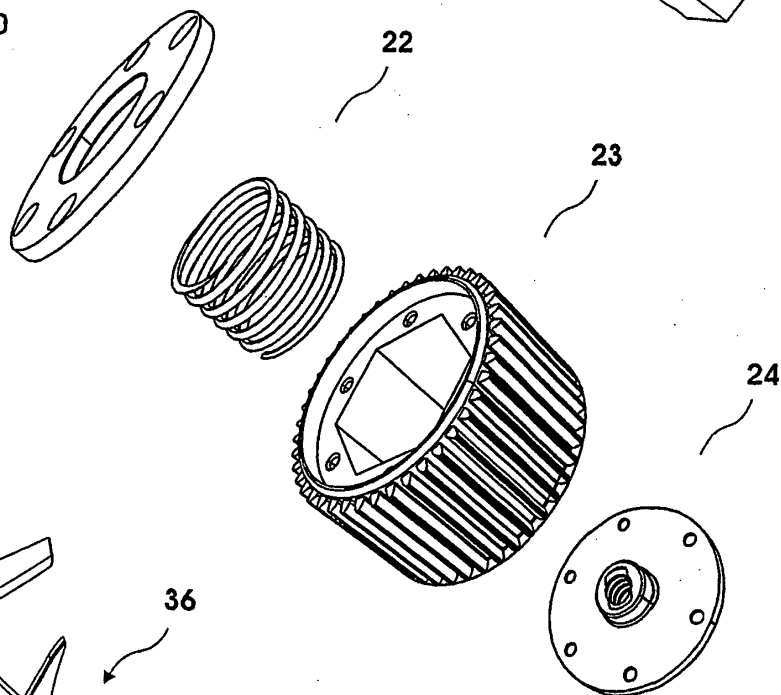
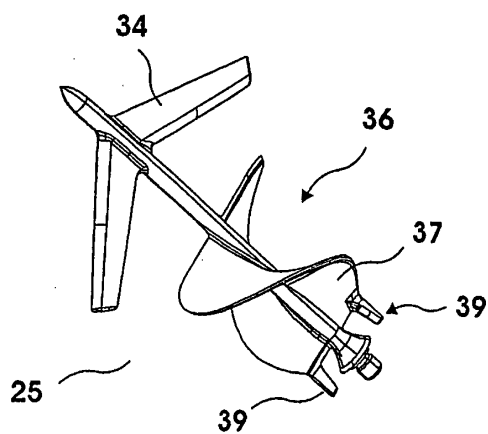


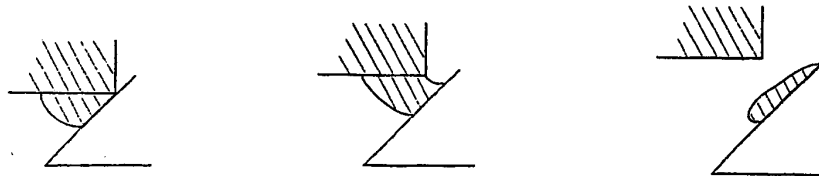
Figure 11



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Figure 12a

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Prior art

Figure 12b

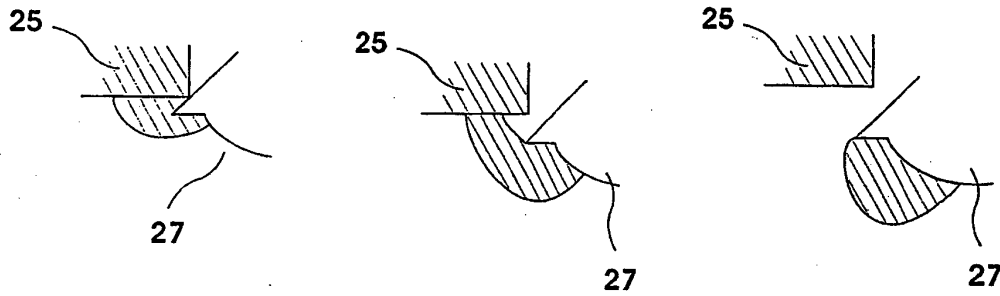
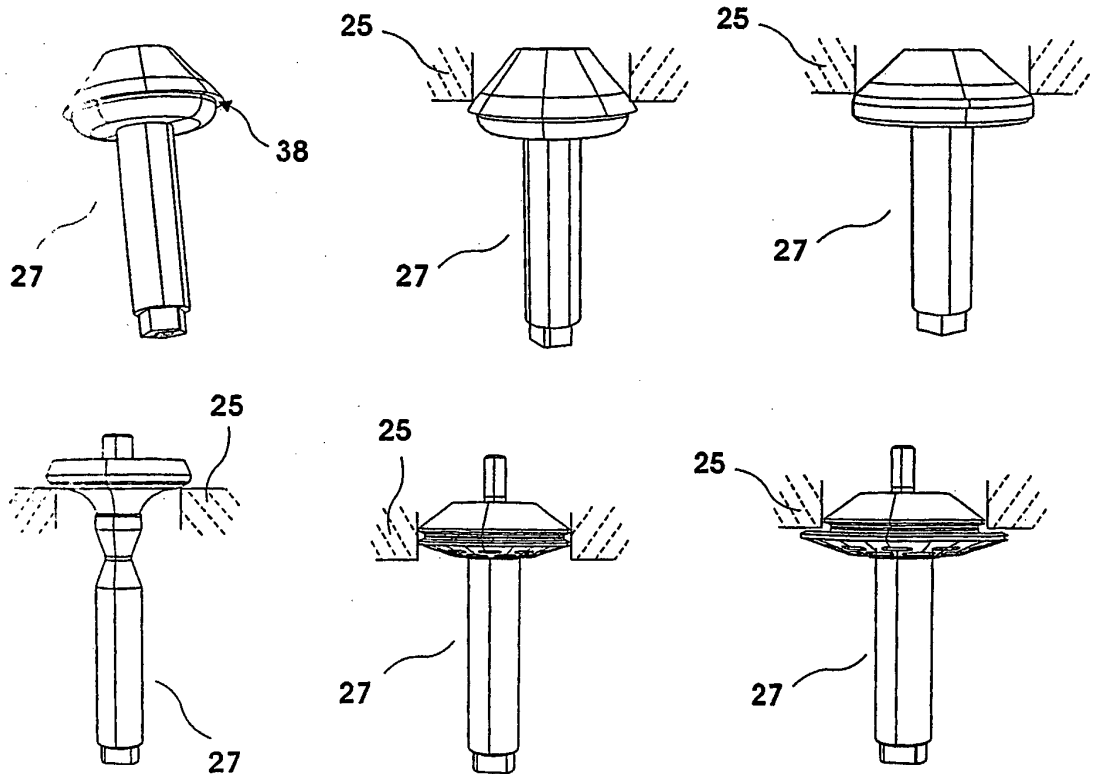


Figure 13



INTERNATIONAL SEARCH REPORT

International Application No

PCT/TR 01/00042

A. CLASSIFICATION OF SUBJECT MATTER
 IPC 7 D06F39/02 A47L15/44

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
 IPC 7 D06F A47L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
 EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A A A	<p>EP 0 217 209 A (HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN) 8 April 1987 (1987-04-08) page 5, line 17 - line 45; claims; figures</p> <p>DE 295 18 415 U (LANDGRAF KUNSTSTOFFE) 28 March 1996 (1996-03-28) page 2, line 39 -page 3, line 13; claims; figures</p> <p>EP 0 297 371 A (HENKEL KOMMANDITGESELLSCHAFT AUF AKTIEN) 4 January 1989 (1989-01-04) cited in the application claims; figures</p>	<p>1</p> <p>2-6,8, 10-14</p> <p>1</p> <p>1</p>

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

21 May 2002

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

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